

Appendix B

COPY OF CLAIMS SHOWING AMENDMENTS

(Deletions are shown by ~~strikethrough~~ and additions are underlined)

1. (*Amended Once*) A bio-assay test system comprising:
a test fixture comprising:
a bio-assay device comprising a multiple-port signal path, the multiple-port signal path having at least one signal input port and one signal output port, the multiple-port signal path operable to support the propagation of a test signal at one or more frequencies from 10 MHz to 1000 GHz and comprising:
a transmission line connected between the at least one signal input port and the at least one signal output port;
a ground element; and
a dielectric substrate attached between the transmission line and ground element; and
a ~~retaining structure~~ sample cavity configured to ~~place~~ retain a volume of sample adjacent to the multiple-port signal path, comprising molecular structures in electromagnetic communication with the signal path whereby an input test signal propagating along the multiple-port signal path is electromagnetically coupled to the sample; and
a measurement system having an output connected to the at least one signal input port of the multiple-port signal path and an input connected to the at least one signal output port of the multiple-port signal path, the measurement system configured to transmit the input test signals to the multiple-port signal path at one or more predefined frequencies, and to receive a modulated test signals from the multiple-port signal path at one or more predefined frequencies; and
a computer ~~coupled~~ connected to the measurement system and configured to control the measurement system's transmission ~~and reception~~ of the input test signals ~~to and from the measurement system~~ and reception of the modulated test signal.

2. (*Amended Once*) The ~~single-path~~ bio-assay test system of claim 1, wherein the measurement system comprises a vector network analyzer configured to compare the magnitude and phase response of the ~~received~~ modulated test signal to the magnitude and phase response of the ~~transmitted~~ input test signal.

3. (*Amended Once*) The ~~single-path~~ bio-assay test system of claim 2, wherein the input test signals comprises a signals in the range of from 5 Hz to 300 MHz.

4. (*Amended Once*) The ~~single-path~~ bio-assay test system of claim 2, wherein the input test signals comprises a signals in the range of from 45 MHz to 40 GHz.

5. (*Amended Once*) The ~~single-path~~ bio-assay test system of claim 2, wherein the input test signals comprises a signals in the range of from 33 GHz to 110 GHz.

8. (*Amended Once*) The ~~single-path~~ bio-assay test system of claim 2, wherein the ~~bio-assay device~~ multiple-port signal path comprises a ring resonator circuit.

11. (*Amended Once*) The ~~single-path~~ bio-assay test system of claim 2, ~~wherein the retaining structure comprises~~ further comprising an O-ring removably compressed around a portion of the signal path, the O-ring configured to hold the sample ~~solution~~ in contact with the multiple-port signal path.

12. (*Amended Once*) The ~~single-path~~ bio-assay test system of claim 2, further comprising:

an input connector ~~coupled~~ connected between the measurement system and a ~~first~~ the at least one signal input port of the multiple-port signal path; and

an output connector ~~coupled~~ connected between the measurement system and a ~~second~~ the at least one signal output port of the multiple-port signal path.

13. (*Amended Once*) A bio-assay array test system, comprising:

a test fixture comprising:

a bio-assay device comprising a plurality of multiple-port signal paths, each multiple-port signal path having at least one signal input port and one signal output port, the multiple-port signal path operable to support the propagation of a test signal at one or more frequencies from 10 MHz to 1000 GHz and comprising:

a transmission line connected between the at least one signal input port and the at least one signal output port;

a ground element; and

a dielectric substrate attached between the transmission line and ground element; and

a plurality of ~~retaining structures~~ sample cavities, each of said sample cavities configured to place retain a volume of sample adjacent to at least one of said plurality of multiple-port signal paths, comprising molecular structures in electromagnetic communication with each of the plurality of signal paths whereby an input test signal propagating along the at least one multiple-port signal path is electromagnetically coupled to the adjacently located sample;

a measurement system having ~~at least one output~~ an output connected to the at least one signal input port of the multiple-port signal path and an input connected to the at least one signal output port of the multiple-port signal path, the measurement system configured to transmit, at one or more predefined frequencies, the input test signals to one or more of the plurality of multiple-port signal paths and to receive a modulated test signals from one or more of the plurality of multiple-port signal paths at one or more predefined frequencies; and

a computer ~~coupled~~ connected to the measurement system and configured to control the measurement system's transmission ~~and reception~~ of the input test signals ~~to and from the measurement system~~ and reception of the modulated test signal.

14. (Amended Once) The bio-assay array test system of claim 13, wherein the measurement system comprises one output port and one input port, and wherein the bio-assay array comprises N a first plurality of signal input ports coupled connected to the plurality of

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multiple-port signal paths and ~~M~~ a second plurality of signal output ports coupled connected to the plurality of multiple-port signal paths, the bio-assay system further comprising:

an ~~1xN~~ input switch having an input ~~coupled~~ connected to the measurement system output port and an output ~~coupled~~ connected to the ~~N~~ first plurality of multiple-port signal path input ports; and

an ~~Mx1~~ output switch having an input ~~coupled~~ connected to the ~~M~~ second plurality of multiple-port signal path output ports and an output ~~coupled~~ connected to the measurement system input port.

17. *(Amended Once)* The bio-assay array test system of claim 13, wherein at least one of the plurality of ~~bio-assay arrays~~ multiple-port signal paths comprises a ring resonator circuit.

20. *(Amended Once)* The bio-assay array test system of claim 13, wherein at least one of the plurality of ~~bio-assay arrays~~ multiple-port signal paths comprises an electronically switched transistor.

21. *(Amended Once)* The bio-assay array test system of claim 13, wherein at least one of the plurality of ~~bio-assay arrays~~ multiple-port signal paths comprises an optically switched transistor.

22. *(Amended Once)* The bio-assay array test system of claim 13, wherein the input test signals comprises a signals in the range of from 5 Hz to 300 MHz.

23. *(Amended Once)* The bio-assay array test system of claim 13, wherein the input test signals comprises a signals in the range of from 45 MHz to 40 GHz.

24. *(Amended Once)* The bio-assay array test system of claim 13, wherein the input test signals comprises a signals in the range of from 30 GHz to 110 GHz.

25. (*Amended Once*) A bio-assay test fixture device, comprising:
a multiple-port signal path having an at least one signal input port and an at least one signal output port, the multiple-port signal operable to support the propagation of a test signal at one or more frequencies from 10 MHz to 1000 GHz and path comprising:
a transmission line connected between the at least one signal input port and the at least one signal output port;
a ground element; and
a dielectric substrate attached between the transmission line and ground element; and
a retaining structure sample cavity configured to place retain a volume of sample adjacent to the multiple-port signal path, comprising molecular structures in electromagnetic communication with the signal path whereby an input test signal propagating along the multiple-port signal path is electromagnetically coupled to the sample;

28. (*Amended Once*) The bio-assay test fixture device of claim 25, wherein the multiple-port signal path comprises a resonant cavity circuit.

31. (*Amended Once*) A bio-assay array test fixture device, comprising
a plurality of multiple-port signal paths, each multiple-port signal path having an at least one signal input port and an at least one signal output port, the multiple-port signal path operable to support the propagation of a test signal at one or more frequencies from 10 MHz to 1000 GHz and comprising:
a transmission line connected between the at least one signal input port and the at least one signal output port;
a ground element; and
a dielectric substrate attached between the transmission line and ground element; and
a respective plurality of retaining structures sample cavities, each of said sample cavities configured to place retain a volume of sample adjacent to at least one of said plurality of multiple-port signal paths comprising molecular structures in electromagnetic

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~~communication with at least a portion of each of the plurality of signal paths~~ whereby an input test signal propagating along said at least one multiple-port signal path is electromagnetically coupled to the adjacently located sample.

32. *(Amended Once)* The bio-assay array test fixture device of claim 31, wherein each multiple-port signal path comprises an electrically-switched transistor.

33. *(Amended Once)* The bio-assay array test fixture device of claim 31, wherein each multiple-port signal path comprises an optically-switched transistor.

